PROBLEMS AT KSU

purple card, kludged saseq, read all channels

- ≈2% events in data mode with all channels zero
- very rarely: data and address bytes mixed up
  ≈ 1 event in 200k (10 chip hybrid)
  ≈ 1 event in 20k (4 chip hybrid)
- chip #4 of 10 chip hybrid: ≈5% bad readouts
  — no RTPS: 0 and 255 ADC count readouts
  — with RTPS: >100 missing channels
- chips #2 and #3 of 4 chip hybrid L1-18:
  occasionally 0 ADC counts in some channels
  when reading out with $>$ 20 Hz

NOISE

mode	4 chip hybrid	10 chip hybrid
calinject	$1.0_{(\text{total})}/\ 0.6_{(\text{diff})}$	$1.3_{(\text{total})}/\ 0.5_{(\text{diff})}$
data 132	$1.0_{(\text{total})}/\ 0.5_{(\text{diff})}$	$1.3_{(\text{total})}/\ 0.6_{(\text{diff})}$
data 396	$1.3_{(\text{total})}/\ 0.5_{(\text{diff})}$	$2.1_{(\text{total})}/\ 0.6_{(\text{diff})}$
calinject rtps	$0.8_{(\text{total})}/\ 0.5_{(\text{diff})}$	$0.7_{(\text{total})}/\ 0.5_{(\text{diff})}$
data 132 rtps	$0.7_{(\text{total})}/\ 0.5_{(\text{diff})}$	$0.8_{(\text{total})}/\ 0.5_{(\text{diff})}$
data 396 rtps	$0.8_{(\text{total})}/\ 0.7_{(\text{diff})}$	$0.8_{(\text{total})}/\ 0.6_{(\text{diff})}$

10k events each, channel A of purple card

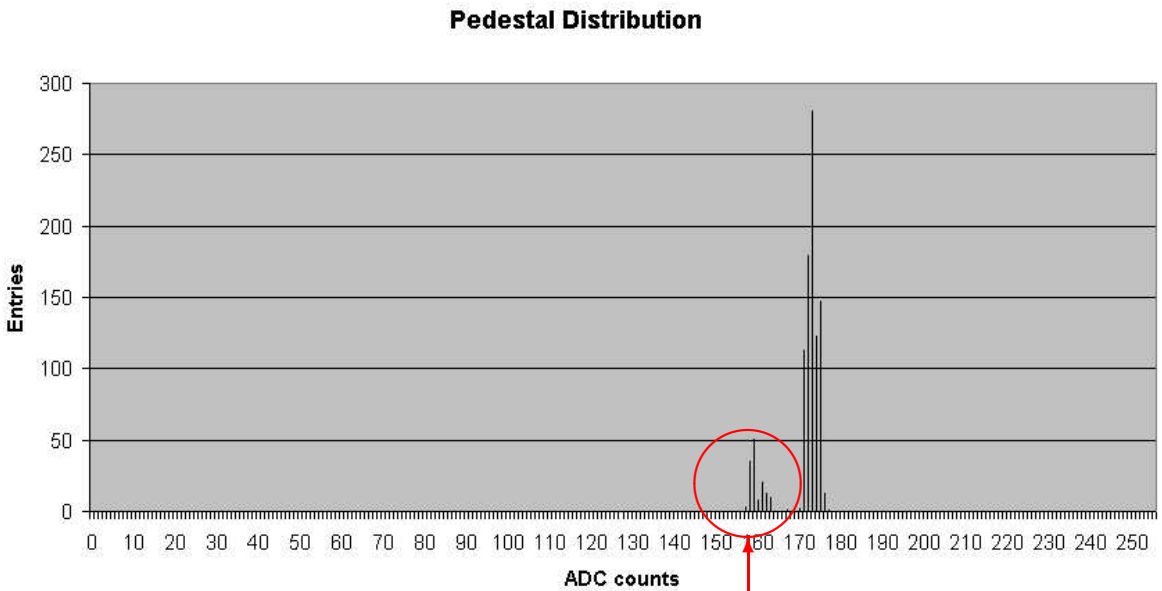
chan. B: common mode noise up to 5 ADC counts!

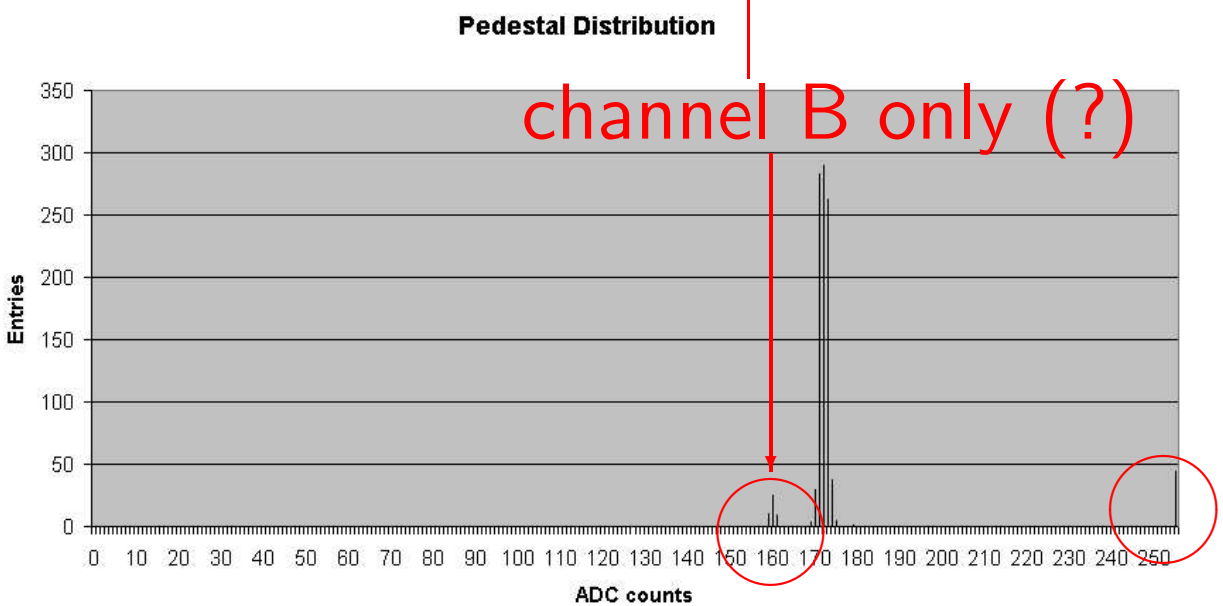
$\longrightarrow$ not always — to be investigated

details

- noise level in data mode is usually spoiled by events with zero ADC count readout. These events are vetoed for the calculation of the results on the previous page
- noise level calculations for the 10 chip hybrid exclude chip 4, which shows significant problems
- there does not seem to be a dramatic difference in readout quality of 4 chip and 10 chip hybrids. However, there seems to be a noise problem with channel B of the purple card. This has been verified by repeatedly changing the channel each hybrid is attached to. The effect does not depend on whether a second hybrid is connected to the other channel. However, the problem does not seem to be always there.
- readout speed was 30Hz for the 10 chip hybrid, 50Hz for the 4 chip hybrid. Default readout speed in spreadsheet is about 15Hz with our current test stand PC. Speed increased by setting lWAITAFTERTRIG in VBA macro DataAry2() to 1ms instead of 30ms.
- chips #2 and #3 of the 4 chip hybrid L1-18 develop problems when being read out with more than 20Hz: Apparent differential noise of 15 ADC counts. Difficult to investigate, because all debug options slow down spreadsheet to below 20Hz, so the problem disappears. However, problems seems to be due to some channels going to 0 ADC counts. $\longrightarrow$ need faster software for hybrid tests?

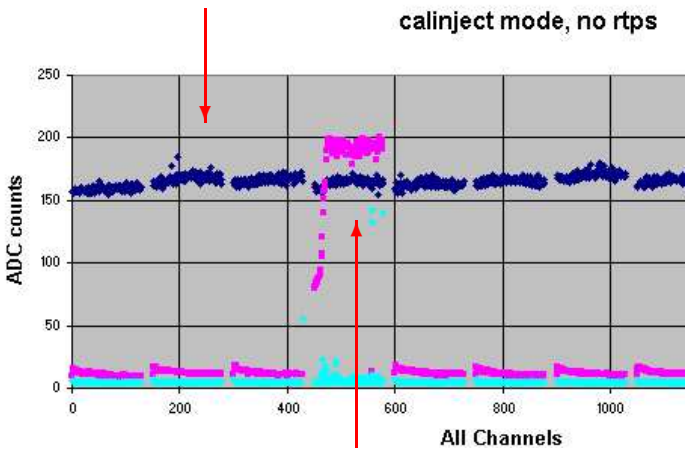
10 chip hybrid pedestal distributions, no RTPS





channel B only (?)

good chip

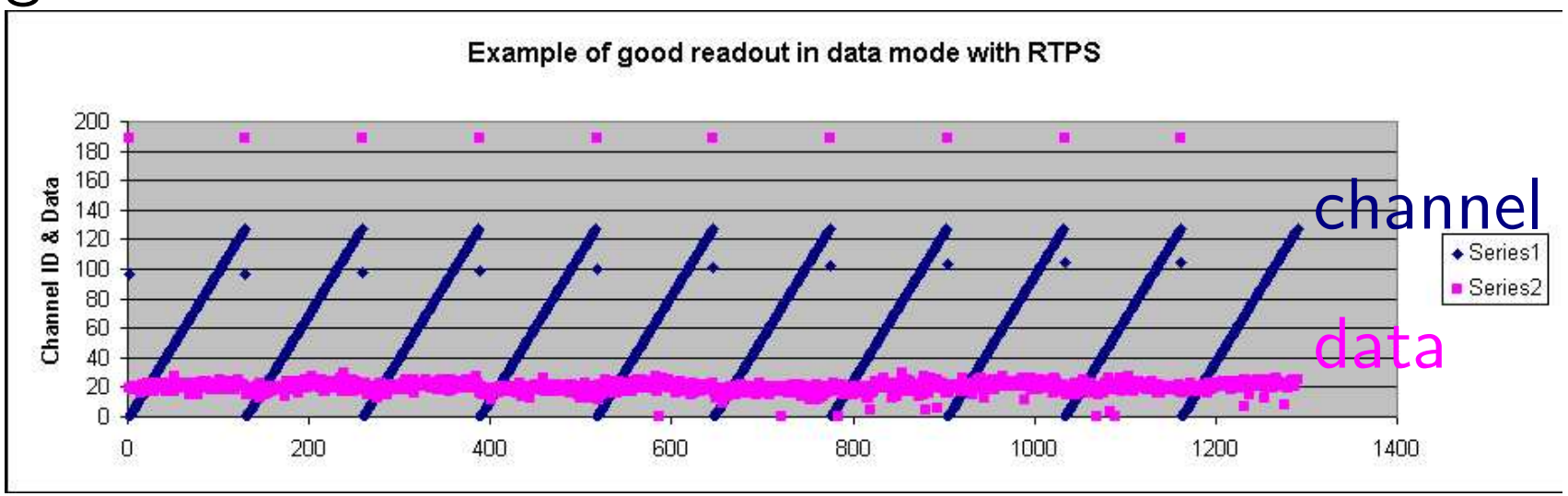


chip # 4

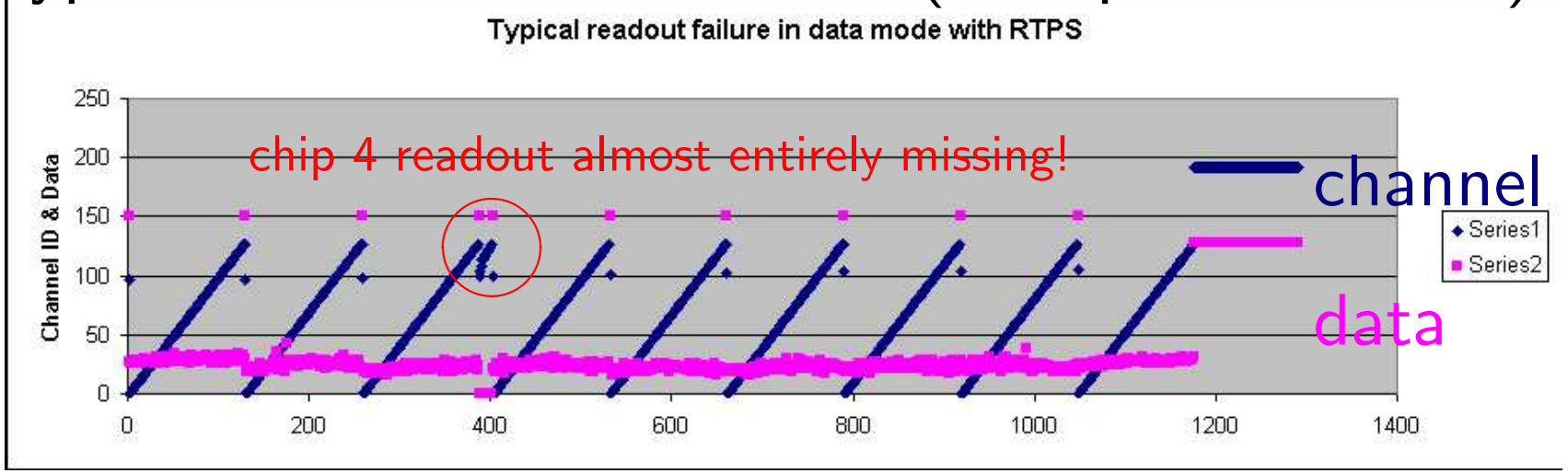
255 ADC counts!

10 chip hybrid with RTPS

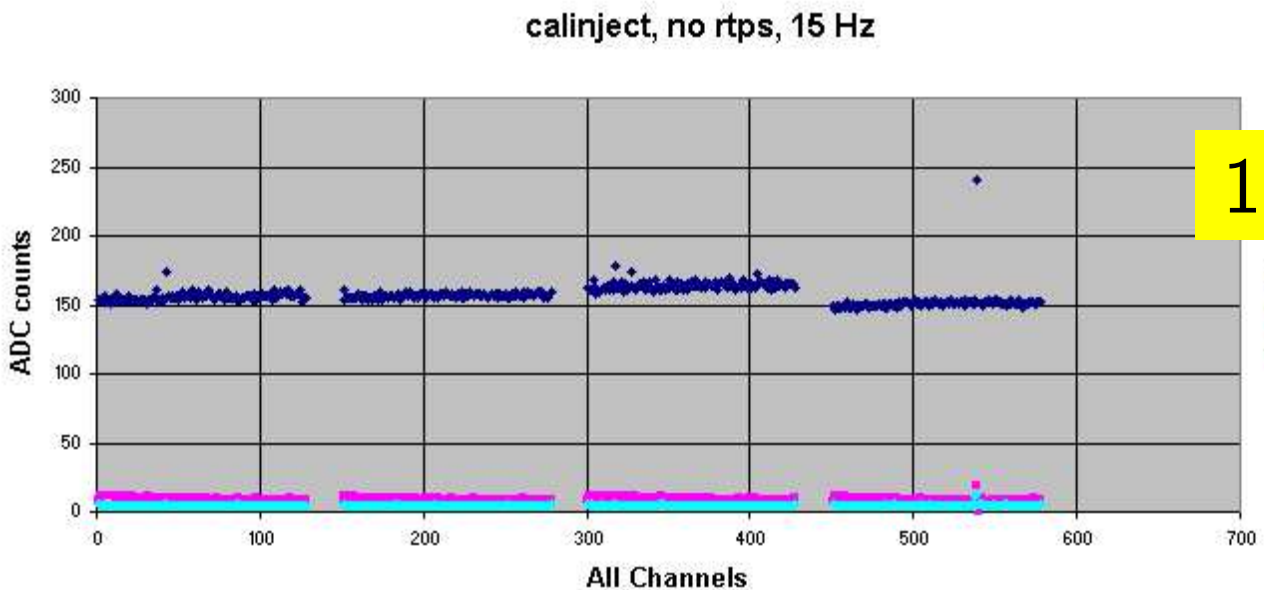
good event in RTPS mode:



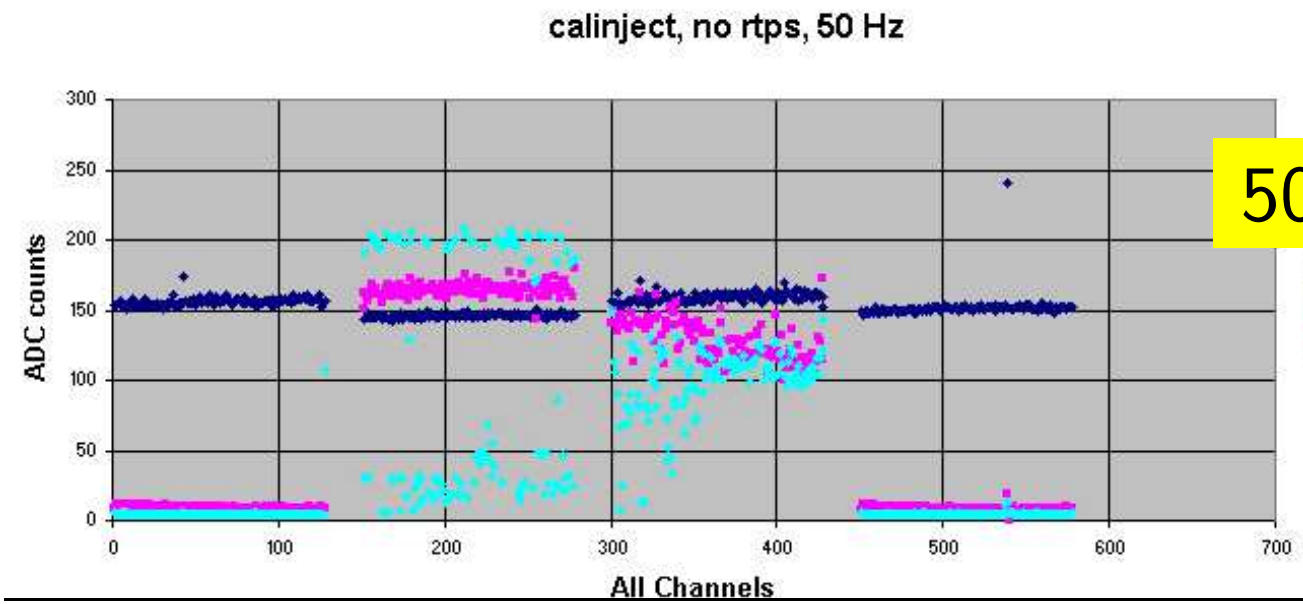
typical failure in RTPS mode ($\approx$ 1 per 20 events):



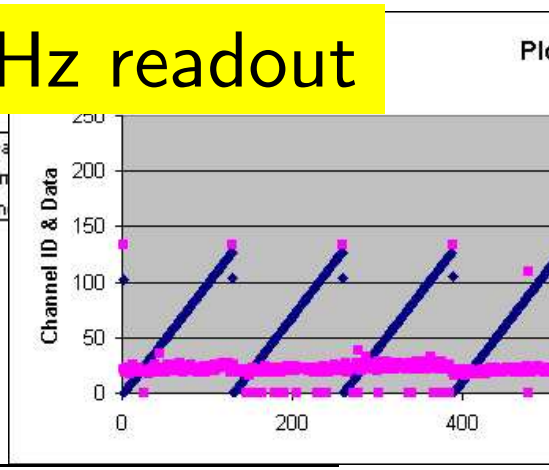
4 chip hybrid noise problem



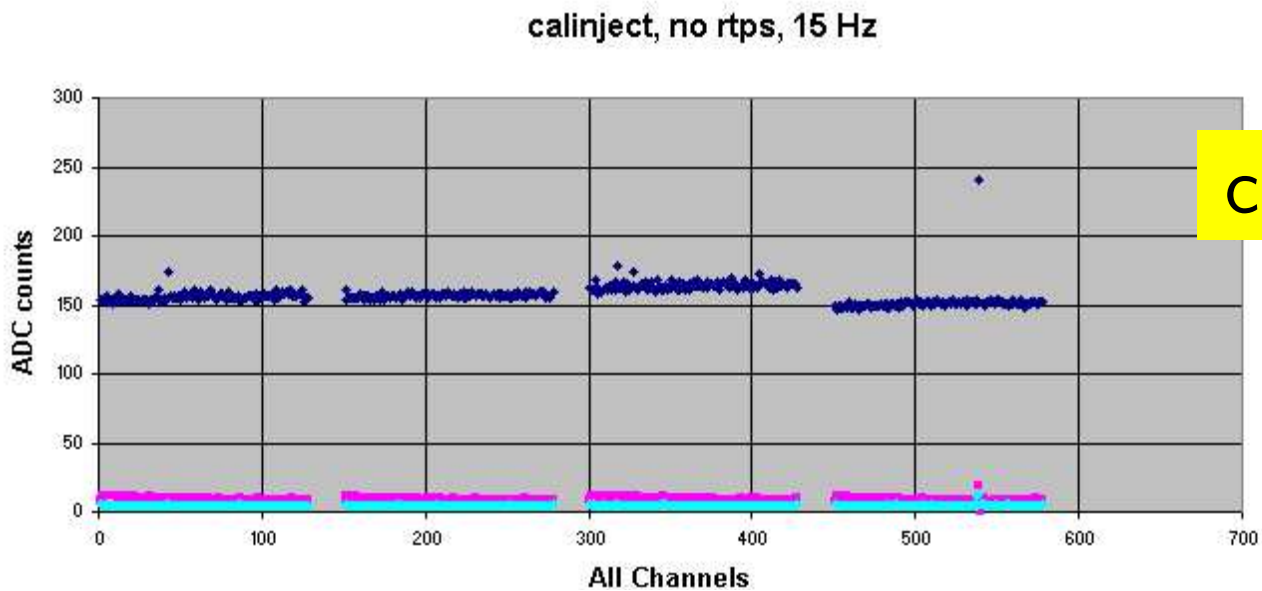
15 Hz readout



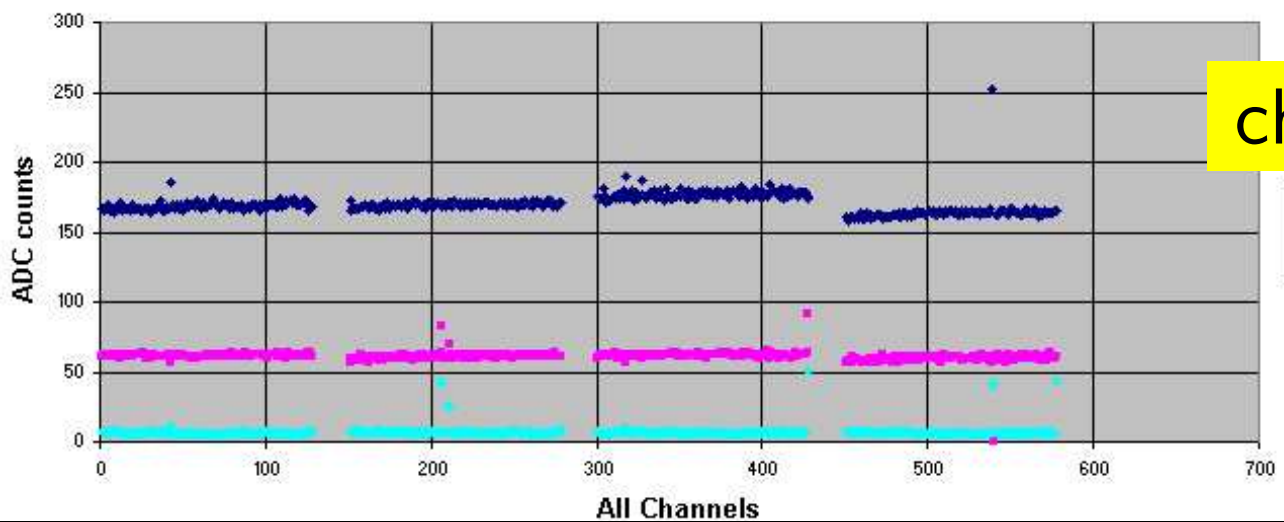
50 Hz readout



purple card channel A/B comparison



channel A

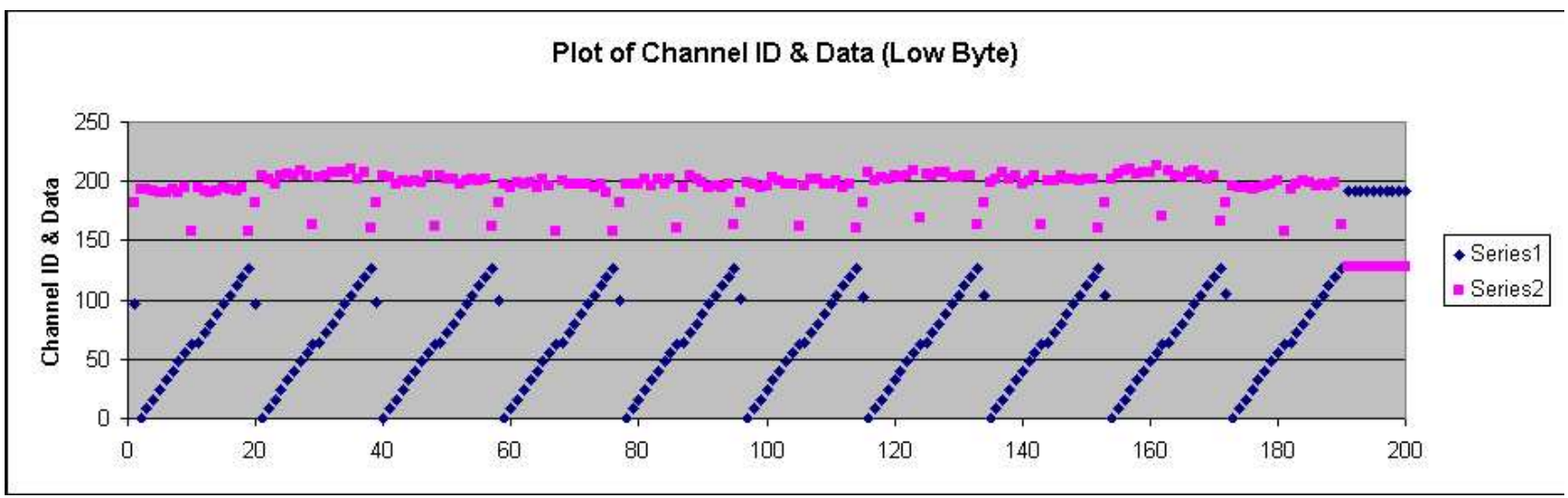


channel B

sparsified/neighbor mode readout

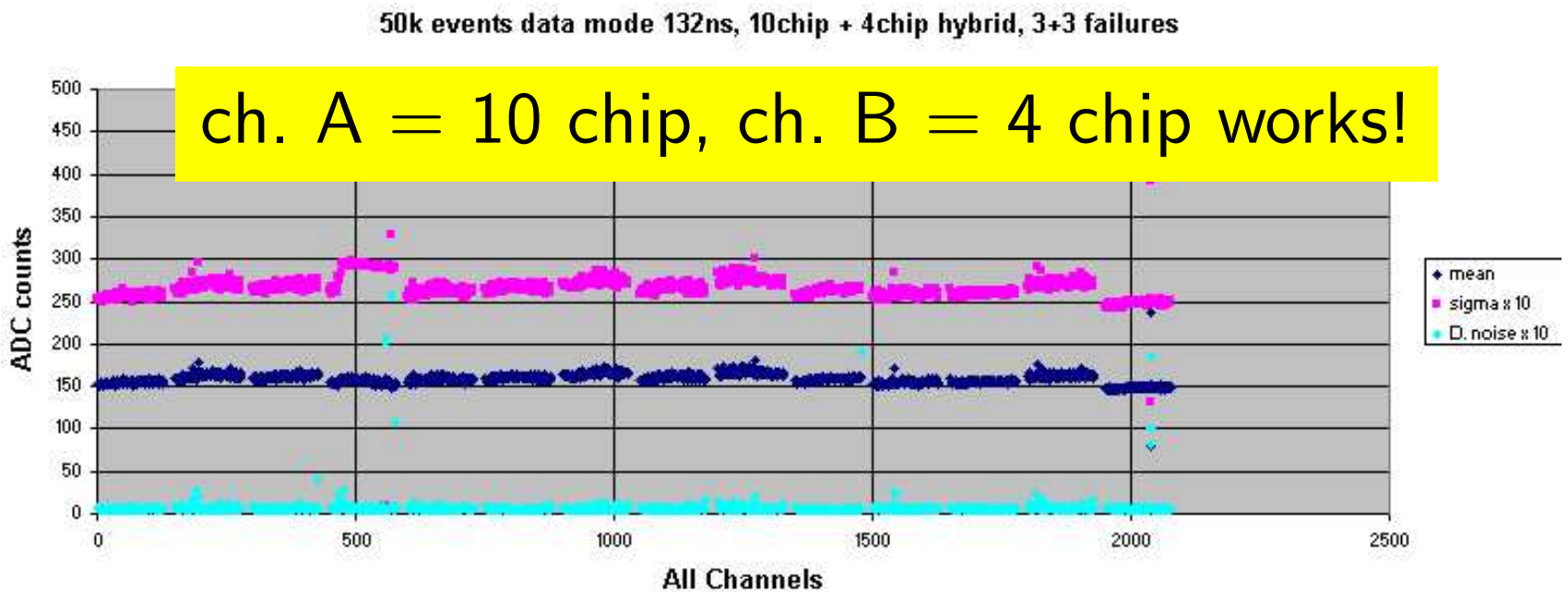
Works fine (except occasional stuttering):

Example: sparse mode (no neighbors), calinjection, threshold EE (only calinjected channels pass), channels 63 and 127 switched on.



Detailed analysis requires significant software work!

two hybrids



ch. A = 10 chip, ch. B = 4 chip works!

ch. A = 4 chip,
ch. B = 10 chip
does not work!